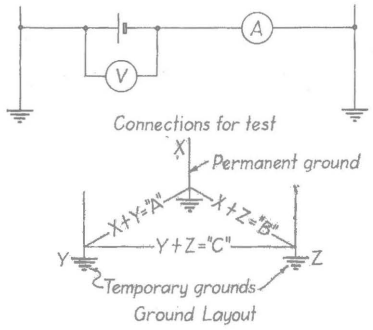
one auxiliary ground rod is driven 25 ft. away and the other 50 ft. away, all three in the same line. We find that this method of testing is very simple and much more accurate than the volt-ammeter method. It is also a great deal faster.

Three-Point Method Convenient

G. A. Washburn

General Signal Inspector, Chesapeake & Ohio, Richmond, Va.

A convenient method of measuring the resistance of a ground with ordinary instruments is as follows: Designating the resistance of the permanent ground X, establish two temporary grounds, Y and Z. Connect the battery, an ammeter and a voltmeter, as shown in the diagram, successively between X and Y, X and Z, and Y



Ground Layout

and Z, recording the readings of volts and amperes, taken simultaneously in each case. Using Ohm's law R=E/I, compute the resistance from each pair of readings, which will be the sum of the separate resistances of the two grounds involved. Designating the resistances X plus Y, "A"; X plus Z, "B"; and Y plus Z, "C," the separate resistance of the permanent ground X is then computed, using the formula, X equals ½ (A plus B minus C).

With the voltmeter connected as shown, the results obtained for A, B and C include the resistance of the ammeter and the wire leads, but this usually can be neglected. If the resistance X of the permanent ground is found to be low and more accurate results are desired, the resistances of the meter and leads may be determined and deducted from the values A, B and C. It is important that the voltmeter and ammeter readings be taken simultaneously, for accurate results. The distance between grounds should not be less than 6 ft., and the test will be more accurate if the temporary grounds have approximately the same (or lower) resistance as the permanent ground. We have found this method to be very good where a ground-ohmmeter is not available.

False Operation of Crossing Signals

"What is the best circuit arrangement to use in order to prevent false operation of a crossing signal for a train pulling out of a passing siding switch located in the ringing section receding from the crossing, or for switching moves?"

For Siding and House Track

E. J. Schaefer

Atlantic Coast Line, Wilmington, N.C.

The accompanying circuit diagrams show two situations and two different methods of crossing signal control, which are designed to eliminate false operation. Figure 1 illustrates a passing track which ends in the receding control section. The reversal of the switch energizes relay WSR, which is held up by relay 1TR after the switch is returned to normal. A train leaving the siding cannot operate the crossing signal owing to relay WSR, through which 2TR is temporarily energized. Of course, this circuit applies to direct track-circuit control of the signals at the crossing. Reversing the procedure, a train approaching the crossing will flash the signals until the switch is reversed, after which they will not

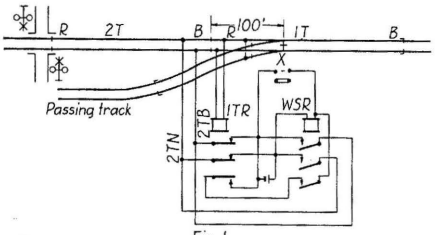


Fig. 1

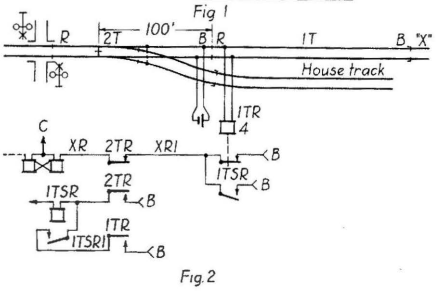


Fig. 2

operate while the train is pulling in the clear.

Figure 2 shows a house-track switch in the approach section. Assuming that a train normally cuts off at "X" for the usual switching and that one move is to be made into the house track, the signals will operate upon the approach of the engine, in the usual manner, and continue to flash until the engine is in the clear on the house track. However, on its return, the signals will operate only so long as the engine occupies section 2T. After the engine backs up and clears section 2T, relay 1TR holds up 1TSR through the latter's own front contact, which prevents the signals from operating during the receding movement on account of relay 1TSR cutting around 1TR on the control of the interlocking relay.

*For more discussion on this subject see page 98 of February issue.

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Signaling at Spring Switches

"In your opinion should some special signal or color-light arrangement, the equivalent of a high switch stand, controlled only by the position of the switch, independently of the automatic block signals, be used at spring switches? What are the advantages of such an arrangement as compared with using ordinary automatic signal protection with or without a switch target?"

Special Signal Advantageous and Justifiable

H. E. Brashares

Assistant Superintendent of Signals, Great Northern, St. Paul, Minn.

In the use of a spring switch, it is of necessity required that the presence of such be easily recognized by trainmen in order to obtain all the benefits possible and to protect against accidents. They must know when their train may trail through it; that it is not advisable to back up after trailing part of their train through it; and whether a speed restriction applies. For these reasons a spring switch must be plainly marked night and day.

When an automatically-operated facing-point lock is used, it is further required to indicate that such lock is in proper operating condition to unlock for a "trailing-through" movement and that the switch is properly locked for a facing-point movement. Both of these are highly important conditions. One may wreck the switch while the other may wreck the train.

With these things in mind it seems to me that a special signal is advantageous and justifiable. It must, in addition to giving the information required, be impossible of confusion with automatic signals.

An arrangement which has proved very satisfactory includes a two-color light signal in a trailing direction at a point to the right of the track and just